William Haywood
July 1849

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No. 49.]

Metropolitan Sewers.

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1 GREEK STREET, 22ND JUNE, 1849.

SIR,

In answer to your question, "What would be the size of sewer that would take the main flow of house sewage of the Metropolis, taking as the data the results of the experiments in Earl street, of the flow upon an ORDINARY DAY, NOT A WATER-DAY, AND EXCLUSIVE OF ALL SURFACE AND STORM WATERS?" I stated to you that a pipe LESS THAN THREE FEET IN DIAMETER would be sufficient. As there appears to have been a misconception of this statement, I deem it necessary that you should be in possession of the data upon which it was based. You are aware that for some time past I have been carrying on, by the order of the Court, experiments on the flow of sewage (from between 11 and 1200 houses) through 15-inch pipes, laid in the Earl-street sewer, by DIRECT ADMEASUREMENT of the flow, at stated periods, through the 24 hours of the day and night. From actual observations the 22nd and 27th Feb.—3rd, 6th, 8th, 10th, 13th, and 15th of March, continued through the 24 hours—DAYS UPON WHICH THERE WAS NO SUPPLY OF WATER to the houses from the Companies, and none from the surface or from storms—a mean flow was deduced of 5·85 cubic feet per minute, occupying a sectional area in the pipe of about 8½ inches, equal to a circle of about 3⅜ inches in diameter, and representing the flow as above from nearly 1200 houses. It was found that the greatest flow on the days when water was supplied to the houses by the Companies was 150 cubic feet per minute, with a mean velocity of 3·6 feet per second, and that the sectional area occupied in the 15-inch pipe by this flow was about 100 inches.

As it was considered that a merely proximate, although at the same time a MAXIMUM estimate was required, I took the results of the ACTUAL OBSERVATIONS on the ORDINARY days of the MEAN FLOW OF HOUSE-DRAINAGE ONLY, as data for estimating the mean flow of the whole of the Metropolis, assuming, of course, the flow in all other places—other things being equal—to be proportionate to the flow observed in the Earl-street sewer; and for the size of pipe that would accommodate this flow, the data given by observations on the greatest flow on water-days, as affording results approximating much more nearly to the flow through a larger pipe.

Taking the sectional area (= 100 inches) of the larger flow (= 150 cubic feet per minute), and the mean velocity generated = 3·6 feet per second, or 2·4 miles per hour, I assumed the sectional area required to accommodate the mean flow of house-sewage only (for the day and night) for the whole of the Metropolis to be proportional to the sectional area of the grea~~test observed~~ flow on water-days, and equal mean velocities in each, and I found that a pipe 35¾ inches, or less than 3 feet in diameter, placed under similar circumstances, would be AMPLE for the purpose ; a deduction based upon upwards of 200 actual observations, and strictly in accordance with every collateral fact and observation within my knowledge.

As I wished entirely to avoid all results not based upon actual observation, I did not give you ANY THEORETICAL deduction of the exact required size, but a size which it was certain (on the data given) would be a maximum.

Had I calculated the acceleration of velocity due to the aggregate mean flow of the Metropolis from the observed accelerated velocity accompanying each increase of flow—an element I should have been perfectly justified in using,—a size VERY MUCH SMALLER than that stated by me would have resulted.

Of course I did not for a moment assume, neither did you so understand it, that the results of the Earl-street experiments would truly represent the whole of the other parts of the Metropolis, except as these were assimilated to it, as this was a point to be ascertained only by experiment.

I am certainly greatly surprised that Mr Phillips, in his letter to the Court of 21st inst., should have so misconstrued your statement, as he must have known from my explanation to him some few days since its exact nature ; but the absurdity of the construction put upon it is, in my opinion, its own refutation, and must be so viewed by every unprejudiced mind, as you EXPRESSLY EXCLUDED the main elements involved in it.

I am, Sir, your most obedient servant,

THOMAS LOVICK.

E. CHADWICK, ESQ., C.B.